New Hampshire Marine Aquaculture License Application
Amendment to License 2017-24

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The purpose of this application is to amend license 2017-24. The amendment would allow for the use of concrete blocks instead of using anchor screws. No other changes to license #2017-24 will be made.

(1) A list of the species to be managed or cultivated;

Currently permitted to culture blue mussel (*Mytilus edulis*).

(2) A description of the proposed project, including:

a. Methodology;

No changes to current methodology

Project Description: The blue mussel aquaculture operation uses a submerged long-line method of culture. The system consists of a long-line with concrete blocks located 600 ft. apart. Attached to the long-line is a buoyed head line from which mussels are suspended. Surface to headline depth is a minimum of 35ft. MLW except during the mussel setting period of May 15 to October 1 when the headline may be raised to optimize the catch of mussel seed. During this time the surface to headline space may be 20 ft. Head line to the end of the attached mussel strings occupies 36 feet of the mid-level water column. The distance from the bottom of the mussel strings to the seafloor is a minimum of 39 feet MLW. This is deployed in water about 110 feet MLW. The total licensed operation consists of 4 separate mussel long lines arranged parallel to each other, all within the licensed 2 acre area. The orientation of longlines shall be consistent with adjacent lobster trawls.

Seed stock for the operation will come from the natural setting of blue mussels at the licensed location and on suspended ropes hung from existing docks and piers along the New Hampshire coastline (including its estuaries and at the existing licensed site). Should seed stock be from out of state, an importation permit from the New Hampshire Fish and Game Department is required.

b. The type of aquaculture operation such as bottom culture, suspended culture, pen culture or a land-based system;

Suspended culture

c. The location and description of the geographic area where the proposed project is to be undertaken described by latitude and longitude coordinates and identified on the most detailed NOAA chart of the particular area or USGS map for a landbased operation;

Site Location: The site is located southwest of White Island Ledge, Isles of Shoals, Rye, NH. The coordinates for the site are:

GPS Coordinates:	Corner 1	42.958889	-70.655556
	Corner 2	42.961944	-70.652222
	Corner 3	42.961944	-70.651944
	Corner 4	42.958889	-70.655278

The licensed site area consists of a 2 acre parcel; within this area 4 mussel lines may be deployed.

d. Site specific information which is available including:

Bathymetry	~125 feet (Avg.)	
Waves[5-10]	Wave Height: <2.3 m 96% of time Wave Height Maxima: > 5 m every month except June and July	
Ocean Current[5-10]	Maine Coastal Current flowing at 5 to 8 cm/s toward the south to south-southwest	
	Under windless conditions, isotropic currents are from 15 cm/s to the southwest (200° true north) to 6 cm/s to the then north (000°true north)	
Water Column Profile[5-10]	Salinity: 31.5-32.8 psu average for entire coastal water column	
	Particulate Organic Matter: <0.5 mg/L to 3.0 mg/L (Seasonal Fluctuations)	
	Dissolved Nitrite-Nitrate: ~1-16 µM (no consistent seasonal trend)	
	Dissolved Phosphate: <0.5 to ~1.5 µM (no consistent seasonal trend)	
Shell Fish:	Lobster, *Homarus americanus*	Impact: None
	Jonah Crab, *Cancer borealis*	Impact: None
	Blue Mussel, *Mytilus edulis*	Impact: None
Fin Fish	Atlantic Cod, *Gadus morhua*	Impact: None
	Haddock, *Melanogrammus aeglefinus*	Impact: None
	Spiny Dogfish, *Squalus acanthias*	Impact: None
	Bluefish, *Pomatomidae saltatrix*	Impact: None
Vegetated bottom:	None	
Sediment Profile:	Gravel / Sand / Mud	

Recreational activities:	Sport fishing And Sailing	Expected Impact: Minimal Adverse	Mitigation: Radar reflective navigation buoys equipped with solar powered LED lights will be placed as an indicator at each corner of the site. Radar reflective high flyers will be used at the ends of each long line within the site. Longlines will be submerged ~8-10 m and will dropped deeper during severe weather conditions.
Commercial activities:	Lobstering	Expected Impact: Minimal Adverse	Mitigation: Site was specifically chosen for the uneven bottom. This bottom topography is not desirable for commercial Lobstering and therefore less likely to interfere with commercial Lobstering activities. Appropriate surface navigation aids will assist local lobsterman, if they desire to set gear on or near the site.
Navigational activities:	Recreation Vessels, Commercial Fishing Vessels, Cargo ,and Naval Yard Shipping lanes	Expected Impact: Minimal Adverse	Mitigation: Radar reflective navigation buoys equipped with solar powered LED lights will be placed as an indicator at each corner of the site. Radar reflective high flyers will be used at the ends of each long line within the site. Longlines will be submerged ~8-10 m and will dropped deeper during severe weather conditions.

5. Navigational aspects such as channels, navigational aids, vessel traffic, or moorings; and

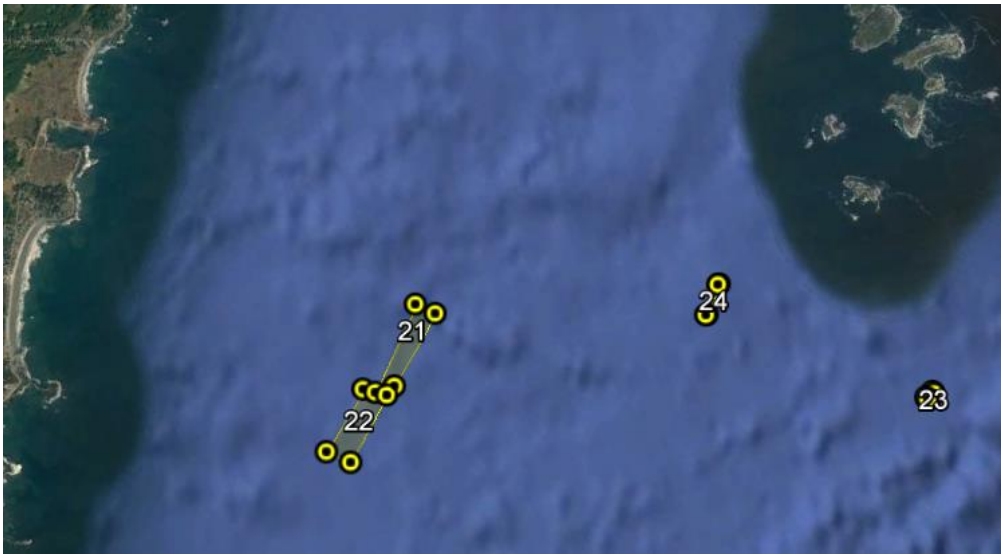

Figure 1. Map shows blue mussel aquaculture sites offshore. Site #24 is being modified by this application.

e. Type, size and configuration of any gear used during any phase of the aquaculture operations and how it will be used;

Submerged longlines will be used for open ocean mussel farming. This technology is highly effective for mussel production in high energy open ocean conditions, such as those of off the New Hampshire coast.[2,3] Figure 5 is a representative schematic illustrating the general configuration of the submerged longline structure that will be used. Briefly, the position and integrity of structure is maintained by submerged floatation, concrete blocks, and polysteel tension rope.[4] Two forces uphold the structure: (1) buoyancy of opposing submerged flotation at each end of the backbone; and (2), tension from the polysteel anchor lines connected at 45° to concrete blocks 800' apart (Figure 5). The submerged depth of the polysteel backbone will be dictated by climate. Vertical buoy lines will be held under tension and equipped with breakaway links set at 1100 lbs. pressure. Continuous mussel growout ropes looping 20-30' in length will be suspended off of the submerged polysteel backbone (Figure 5). Approximately 25' of bottom space will be provided. The site will accommodate four 800' longlines. The longlines will be set in a northeast to southwest direction and radar reflective navigation aids will be located at the ends of each longline.

Site maintenance is a key component to the success of the business. At regular intervals the team will be checking longline integrity, the positioning of the longline backbone, and removing fouling from the gear. In addition, annual UW video monitoring will be conducted to evaluate the integrity of mooring system.

The site will be tended by a commercial fishing vessel equipped with the appropriate gear, such as fabricated hydraulic starwheels and mechanical socking and harvesting equipment.

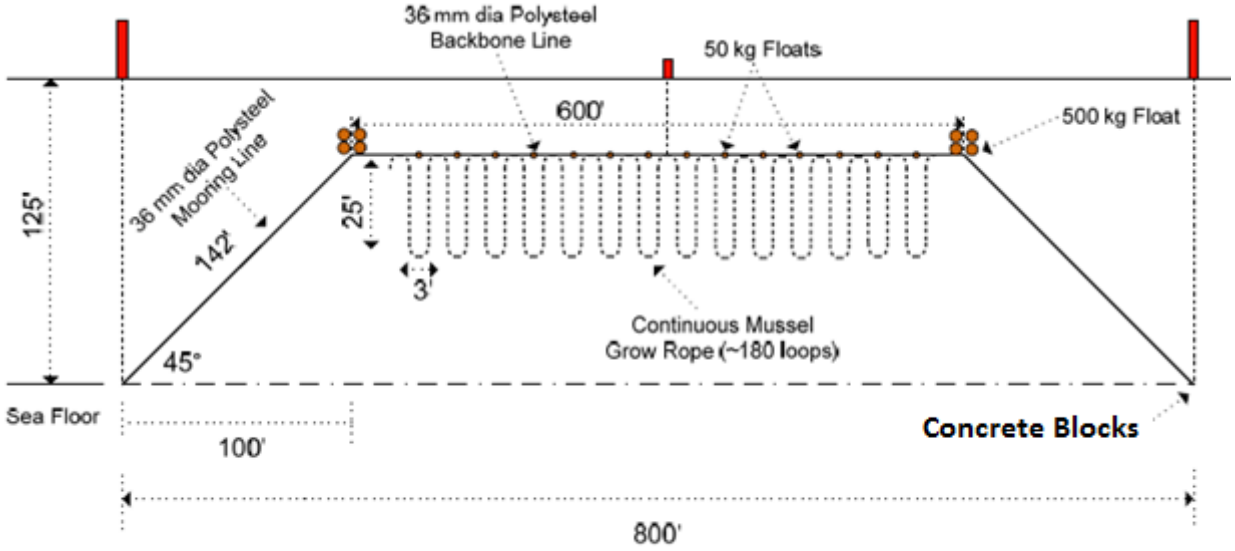

Figure 5. A representative schematic of a general submerged longline used for suspension culture of *Mytilus edulis*.

(3) Source of organisms to be utilized throughout the project;

The natural aquatic environment will be the seeding source for this operation. Spat from UNH's Open Ocean site or inshore spat program might be utilized. If spat from a different site is used the spat will be soaked in fresh water to kill potential invasive species. UW video monitoring will be incorporated as part of an annual site review. This will be an opportunity to assess the manifestation of an invasive species community.

(4) Disposition of organisms during the various phases of the project;

1. The species disposition and aquaculture operation cycle occurs in five distinct phases:
   Spat Collection: Spawning mussel spat (or juvenile mussel larvae) float freely in the water, typically being most dense in the upper 4 m of the water column, and settle on solid substrates. Spat collectors or "collection" ropes will be hung from the longline backbone for spat adherence. Spat collection will occur in spring and fall. Exact timing of spat collection depends on the mussel spawning cycle though for New Hampshire waters, peak abundances typically occur in late June and late September.

2. Spat Socking: Spat collectors will be retrieved once juvenile mussels are approximately 20-25 mm in size (about 5 months post-set).[3] The mussels will be removed, graded for size, and socked in biodegradable mesh surrounding the growout rope. The "socked" mussel growout ropes are then suspended from the backbone line. The entire process of stripping, grading, and socking is mechanized and will be performed onboard the vessel.

3. Growout Period and Longline Maintenance: During the 12-16 month growout period the longlines will be maintained. Maintenance will include activities such as the removal of fouling (e.g., starfish, etc.) and the addition extra submerged flotation as the mussels continue to grow. Navigation aid upkeep and the adjusting of backbone depth during inclement weather conditions will also occur during routine maintenance.

4. Harvest: After the growout period the mussels will be harvested and bagged on the vessel. Any waste from declumping and bagging will be disposed in accordance with NH Fish & Game requirements.

5. Landing of harvested mussels will occur in New Hampshire seaports and applicant will properly record all sales and transactions for review and obtain any required State of New Hampshire licenses for sale of the product.

(5) A list of any biocides, algaecides, antibiotics or other methods of control or treatment to be used during the project;

There will be no use of biocides, algaecides, antibiotics or other chemical methods of control or treatment to be used during this operation. General maintenance will entail the removal of fouling organisms, such as starfish; however, little is anticipated. In addition, no canopy nets will be used to reduce the impact to local finfish, mammal, and avian species.

(6) A description of any restricted use proposed by the aquaculture project which shall include identifying any existing activity which would be restricted or prohibited;

The area in request is nonexclusive. The proposed site is under the domain of the State of New Hampshire and does not encroach on private property.

(7) A written statement that the applicant either owns or has written permission from the owner(s) to exercise any littoral right, necessary to carry out the proposed project;

N/A

(8) List of agencies to whom copies of complete application will be sent as required in Fis 807.07 (g)(2); and

New Hampshire Fish and Game Department
2 Hazen Drive
Concord, NH 03301
New Hampshire Fish and Game

Marine Fisheries Division
225 Maine Street
Durham, NH 03824

Food Protection
Division of Public Health Services
New Hampshire Department of Health and Human Services
Attn: Deborah Scoville
29 Hazen Drive
Concord, MA 03301-4604

Shellfish Program
New Hampshire Department of Environmental Services
Attn: Chris Nash
222 International Drive suite 175
Pease Tradeport
Portsmouth, NH 03801

Wetlands Bureau
New Hampshire Department of Environmental Services
Attn: Dori Wiggin
222 International Drive suite 175
Pease Tradeport
Portsmouth, NH 03801

U.S. Army Corps of Engineers
New England District
Attn: David Keddell
696 Virginia Rd.
Concord, MA 01742

New Hampshire State Port Authority
Attn: Geno Marconi
Pease Tradeport

55 International Drive
Portsmouth, NH 03801

US Coast Guard
Attn: Station Commander
25 Wentworth Road
New Castle, NH 03854

(9) A copy of the current municipal tax map and complete list of names and addresses of all the abutters and littoral owners to the proposed project.

To our knowledge the only abutters to this open ocean site would be the following:

Lunging Island Trust
Randall Ray Trustee
37 North Belgian Rd
Danvers, MA 01923

White Is
DRED
P.O. Box 1856
Concord, NH 03301